

REMARKS/ARGUMENTS

In view of the foregoing amendments and the following remarks, the applicants respectfully submit that the pending claims comply with 35 U.S.C. § 112, are not anticipated under 35 U.S.C. § 102 and are not rendered obvious under 35 U.S.C. § 103. Accordingly, it is believed that this application is in condition for allowance. **If, however, the Examiner believes that there are any unresolved issues, or believes that some or all of the claims are not in condition for allowance, the applicant respectfully requests that the Examiner contact the undersigned to schedule a telephone Examiner Interview before any further actions on the merits.**

The applicants will now address each of the issues raised in the outstanding Office Action.

Rejections under 35 U.S.C. § 112

Claims 1 and 42 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the application. In particular, the Examiner notes that element (b) implies that determining a direction of arrival is an option, but element (c) seems to require such a determination. The applicants see no inconsistency. From element (c), the direction of arrival is used and therefore must be determined or otherwise received. Element (b) indicates that the direction of arrive may be received, perhaps with

neither, one, or both of time of arrival and amplitude. In any event, these claims have been amended to remove the perceived inconsistency. Therefore, this ground of rejection should be withdrawn.

Rejections under 35 U.S.C. § 102

Claims 1-12, 14, 16-25, 42-44, 46 and 48-53 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent Application Publication No. US-2002/0196188 ("the Holt publication"). The applicants respectfully request that the Examiner reconsider and withdraw this ground of rejection in view of the following.

Before addressing at least some of the patentable features of the claimed invention, the applicants will introduce the Holt publication.

The Holt publication proposes methods for locating mobile devices that use a combination of Time Difference of Arrival (TDOA) and Angle of Arrival (AOA) information. More specifically, pure TDOA methods require a minimum of three (3) receiving stations to determine a unique location at the intersection of three (3) equi-TDOA hyperbolas. One embodiment discussed in the Holt publication uses a "proxy receiver" as one of the three (3) receivers. The proxy is a building or other scattering object at a known position. The signal scattered from this proxy receiver would be received by the actual receiver, which would use some form of directional antenna to select its known AOA. By subtracting the computed or calibrated travel time between the proxy receiver and actual receiver from the TDOA at the actual receiver, the travel time from the

mobile to the proxy receiver can be determined. (See, e.g., paragraphs [0040] and [0064].) The system would then intersect the equi-TDOA hyperbolas to find the mobile location.

Another embodiment of the Holt publication uses the TDOA information from a single receiver and a single proxy receiver. (See, e.g., Figures 3 and 4 and paragraphs [0064] and [0065].)

Each of the single non-proxy receiver embodiments discussed in the Holt patent use one line-of-sight signal from the mobile to a non-proxy receiver. Where multipath is present, such as in an urban environment, two (2) non-proxy receivers are used. (See, e.g., Figures 5 and 6 and paragraphs [0066]-[0068].)

Having introduced the Holt publication, a patentable feature of the claimed invention is now discussed. Specifically, independent claims 1 and 42 are not anticipated by the Holt publication because the Holt publication does not teach determining at least two trace-back rays from the observation point **using solely the direction of arrival of signals** and topographical information, and **determining at least one candidate location at crossings of two or more trace-back rays.** Instead, the Holt publication methods must have the TDOA information, and works using signals that are scattering only once by any building, which then serves as a proxy receiver.

The claimed invention is advantageous in that it can make use of signals that are multiply reflected on their path from the mobile device to a single receiver.

Thus, claims 1 and 42 are not anticipated by the Holt publication for at least the foregoing reason.

Since claims 2-12, 14 and 16-25 depend, either directly or indirectly from claim 1, and since claims 43, 44, 46 and 48-53 depend from claim 42, these claims are not anticipated by the Holt publication for at least the same reason.

Claims 1-11, 13, 14, 16-25, 42, 43, 45, 46 and 48-53 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,282,426 ("the Wang patent"). The applicants respectfully request that the Examiner reconsider and withdraw this ground of rejection in view of the following.

Before addressing at least some of the patentable features of the claimed invention, the applicants will introduce the Wang patent.

The Wang patent determines a location based on Time of Arrival (TOA) information of signals from satellites to a mobile receiver/transmitter. In one embodiment, information from three (3) TOA signals leads to an approximate location. Ray tracing from on a grid of pre-selected points in a "zone" about the estimated point is then used to determine a final or corrected location. (See, e.g., column 8, lines 16-56.)

Other embodiments using information from two (2) or one (1) TOA information are said to work in cellular system where the cell sector of the mobile is known from other means.

In both embodiments, the mobile device must include a receiver to receive TOA information (e.g., from GPS satellites), and a transmitter to transmit such information to a base station controller. Further, ray tracing is performed from or to a set of predetermined

grid points within a determined zone to a receiver. A raw, position fix is then matched to a closest predicted mobile station location. An intersection(s) of multiple rays traced back based on an angle of arrival at a receiver is not determined.

Having introduced the Wang patent, a patentable feature of the claimed invention is now discussed. Specifically, independent claims 1 and 42 are not anticipated by the Wang patent because the Wang patent does not teach determining at least two trace-back rays from the observation point ***using solely the direction of arrival of signals*** and topographical information, and ***determining at least one candidate location at crossings of two or more trace-back rays***.

Thus, claims 1 and 42 are not anticipated by the Wang patent for at least the foregoing reason. Since claims 2-11, 13, 14 and 16-25, depend, either directly or indirectly from claim 1, and since claims 43, 45, 46 and 48-53 depend from claim 42, these claims are not anticipated by the Wang patent for at least the same reason.

Claims 1-12, 14, 16-25, 42-44, 46 and 48-53 stand rejected under 35 U.S.C. § 102(b) as being anticipated by N.J. Thomas et al., "Calculation of mobile location using scatterer information", Electronics Letters, Vol. 37(19), pp. 1193-1194 (September 2001) ("the Thomas article"). The applicants respectfully request that the Examiner reconsider and withdraw this ground of rejection in view of the following.

Before addressing at least some of the patentable features of the claimed invention, the applicants will introduce the Thomas article.

The location method discussed in the Thomas article use the AOA and TOA (with respect to the first arriving ray) and the Doppler shift as measured at a single base station. The Thomas article works on the assumption that the ray undergoes a single reflection (or multiple reflections if they are so close together that they can be treated as a single reflection). The method discussed in the Thomas article appears to be a generalization of the triangulation method discussed in the Holt publication because the equations to be solved for location involve the time difference of arrival.

Having introduced the Thomas article, a patentable feature of the claimed invention is now discussed. Specifically, independent claims 1 and 42 are not anticipated by the Thomas article because the Thomas article does not teach determining at least two trace-back rays from the observation point ***using solely the direction of arrival of signals*** and topographical information, and ***determining at least one candidate location at crossings of two or more trace-back rays***.

Thus, claims 1 and 42 are not anticipated by the Thomas article for at least the foregoing reason. Since claims 2-12, 14 and 16-25 depend, either directly or indirectly from claim 1, and since claims 43, 44, 46 and 48-53 depend from claim 42, these claims are not anticipated by the Thomas article for at least the same reason.

Rejections under 35 U.S.C. § 103

Claims 13, 15, 45 and 47 stand rejected under U.S.C. § 103(a) as being unpatentable over the Holt publication in view of either one of F.A. Katsriku, "Propagation Characteristics of Wireless Channels," lecture notes, (published at least by February 2003) ("the Katsriku article") or D. Jenn, "Overview of Electromagnetic Wave Propagation," lecture notes (published at least by Spring 2003) ("the Jenn article"). The applicants respectfully request that the Examiner reconsider and withdraw this ground of rejection in view of the following.

The Examiner cites the Katsriku and Jenn articles as teaching that electromagnetic signals for use in wireless communication are affected by attenuation, reflection, diffraction, refraction, scattering, attenuation and depolarization. The Examiner concludes that it would have been obvious to include all of the electromagnetic effects that affect wireless communication signals to calculate an accurate emitter source location. (See Paper No. 20041210, page 5.) Even assuming, arguendo, that the Katsriku and Jenn articles include the purported teachings, and that one skilled in the art would have been motivated to modify the Holt publication as proposed by the Examiner, such purported teachings would still not compensate for the deficiencies of the Holt publication, discussed above, with respect to claims 1 and 42. Since claims 13 and 15 depend from claim 1, and since claims 45 and 47 depend from claim 42, these claims are not rendered obvious by the Holt publication and the Katsriku and Jenn articles for at least this reason.

Claims 12, 15, 44 and 47 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Wang patent in view of either one of the Katsriku article and the Jenn article. The applicants respectfully request that the Examiner reconsider and withdraw this ground of rejection in view of the following.

As discussed above, the Examiner cites the Katsriku and Jenn articles as teaching that electromagnetic signals for use in wireless communication are affected by attenuation, reflection, diffraction, refraction, scattering, attenuation and depolarization, and concludes that it would have been obvious to include all of the electromagnetic effects that affect wireless communication signals to calculate an accurate emitter source location.

Even assuming, arguendo, that the Katsriku and Jenn articles include the purported teachings, and that one skilled in the art would have been motivated to modify the Wang patent as proposed by the Examiner, such purported teachings would still not compensate for the deficiencies of the Wang patent, discussed above, with respect to claims 1 and 42. Since claims 12 and 15 depend from claim 1, and since claims 44 and 47 depend from claim 42, these claims are not rendered obvious by the Wang patent and the Katsriku and Jenn articles for at least this reason.

Claims 26-41 stand rejected under U.S.C. § 103(a) as being unpatentable over the Holt publication, the Wang patent and the Thomas article (as applied to claim 24) in further view of U.S. Patent No. 6,104,345 ("the Tweg patent"). The applicants respectfully request that the

Examiner reconsider and withdraw this ground of rejection in view of the following.

The Examiner cites the Tweg patent as teaching a direction of arrival (DoA) positioning system that uses the cardinality of a set of possible location solutions to determine the most probable location, and concludes that it would have been obvious to include such a cardinality method to determine the most probably location for the object in the Holt publication, the Wang patent, or the Thomas article.

First, even assuming, arguendo, that the Tweg patent includes the purported teaching, and that one skilled in the art would have been motivated to modify the Holt publication, the Wang patent, or the Thomas article as proposed by the Examiner, such purported teachings would still not compensate for the deficiencies of these references, discussed above, with respect to claim 1. Since claims 26-41 depend, indirectly, from claim 1, these claims are not rendered obvious by the Holt publication, the Wang patent, or the Thomas article, in view of the Tweg patent for at least this reason.

Second, the proposed combination neither teaches, nor suggests, the specific features recited in the claims. If the Examiner maintains this ground of rejection, the applicants respectfully request that he address each of the recited features in these claims.

Third, one skilled in the art would not have been motivated to modify the Holt publication, the Wang patent, or the Thomas article, in view of the Tweg patent as proposed by the Examiner. Specifically, the Tweg patent concerns algorithms for finding the AOA (same as their Direction of Arrival - DOA) of signals when some

multipath is present under conditions of continuous tracking of an object. The Tweg patent deals with signal processing procedures to obtain the best estimate of the AOA at a fixed station. It does not address the issue of locating a mobile in a multipath environment. In particular, the section of the Tweg patent cited by the Examiner is provided in the context of associating potential track points with active tracks. (See, e.g., column 9, lines 18 and 19.) A maximum a-posteriori criterion is used as a selection rule. (See, e.g., column 9, lines 64 and 65. Cardinality is discussed in the context of the cardinality of the set of all potential associations (of potential track points to active tracks) (See, e.g., column 10, lines 35-60.), not the cardinality (e.g., number of intersections) in each of a number of candidate areas of accuracy as claimed. There is no suggestion to use a technique for associating potential track points to active tracks, to determine a most probable object location. Accordingly, claims 26-41 are not rendered obvious by the Holt publication, the Wang patent, or the Thomas article, in view of the Tweg patent for at least this additional reason.

New claims

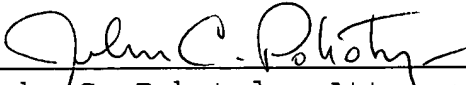
New claim 54 depends from claim 1 and includes elements deleted from original claim 1. Similarly, new claim 55 depends from claim 42 and includes elements deleted from original claim 42.

Conclusion

In view of the foregoing amendments and remarks, the applicants respectfully submit that the pending claims are in condition for allowance. Accordingly, the applicants request that the Examiner pass this application to issue.

Respectfully submitted,

September 27, 2005


John C. Pokotylo, Attorney
Reg. No. 36,242
Tel.: (732) 542-9070

CERTIFICATE OF MAILING under 37 C.F.R. 1.8(a)

I hereby certify that this correspondence is being deposited on **September 27, 2005** with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.


John C. Pokotylo

36,242
Reg. No.